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VERIFICATION OF A TRANSLATION

Commissioner for Patents
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I, the below named translator, hereby declare that my name and post office address are as stated below; that I am knowledgeable in the English language and in the language of the following document:

Japan Patent Application No. 2002-301647, filed October 16, 2002

and I believe the attached English translation to be a true, accurate and complete translation of this document; and that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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[List of the Documents]

[Item] Specification 1

[Item] Drawings 1

[Item] Abstract 1

[General Power of Attorney No.] 001626

[Name of the Document] SPECIFICATION

[Title of the Invention] DEVICE FOR PLACING ELASTIC MEMBER

[Claims]

[Claim 1] A device for placing an elastic member, comprising:

a pair of nip rolls for pressing an elastic member onto a web;

a moving member, which is movable;

a guide section formed on the moving member for guiding the elastic member onto the web;

a transfer section capable of reciprocating the moving member; and

a sensor for detecting the moving member at a predetermined position,

wherein an original position of the moving member is set based on a detection signal from the sensor when the moving member approaches the sensor while moving in a first direction.

[Claim 2] A device for placing an elastic member, comprising:

a pair of nip rolls for pressing an elastic member onto a web;

a moving member, which is movable;

a guide section formed on the moving member for guiding the elastic member onto the web;

a transfer section capable of reciprocating the moving member at a predetermined cycle;

a motor capable of rotating in a forward direction and in a reverse direction to drive the transfer section so that the elastic member is placed on the web along a predetermined trace;

a sensor for detecting the moving member at a predetermined position; and

a controller for determining an original position of the motor based on a detection signal from the sensor,

wherein the controller determines the original position based on a detection signal from the sensor when the moving member is moving in a predetermined first direction, and does not determine the original position when the moving member is moving in a second direction different from the first direction.

[Claim 3] A device for placing an elastic member according to claim 2, wherein:

a plurality of sensors are provided, for different sizes of articles to be produced, in a direction in which the moving member moves;

a plurality of original positions are set corresponding to the plurality of sensors; and

storage means is provided for storing control patterns for the motor corresponding to the original positions.

[Claim 4] A device for placing an elastic member according to claim 1, 2 or 3, wherein at least one of the pair of nip rolls can be moved away from the other nip roll.

[Claim 5] A device for placing an elastic member according to claim 1, 2, 3 or 4, wherein:

the device further comprises a stand to which the transfer section and the moving member are attached; and

the stand is movable so that a distance between a nip point between the pair of nip rolls and the guide section can be changed.

[Claim 6] A device for placing an elastic member according to claims 1 to 5, wherein the stand to which the transfer section and the moving member are attached is movable along an axial line of the nip rolls.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a device for placing an elastic member.

[0002]

[Prior Art]

In a disposable worn article such as a paper diaper, an elastic member is placed at a predetermined position for forming gathers (see, for example, Patent Document 1). A gather control device described in this publication includes a pair of nip rolls for sandwiching a rubber between two webs, and an aperture section for guiding the rubber between the webs.

The device places the rubber in a predetermined pattern on the web by moving the aperture section. The line along which the

rubber is placed varies for different sizes and designs of articles. If, for example, the position of the rubber placed on the web along leg portions is shifted from the position of leg holes made in the web, a good product cannot be produced. Therefore, it is important to accurately form the line at a predetermined position.

[0003]

[Patent Document 1]

Japanese Laid-Open Patent Publication No. 9-70412 (Page 3, FIG. 1)

[0004]

[Problems to be Solved by the Invention]

However, the publication mentioned above fails to teach how to determine the start position of the pattern. If the start position is shifted, an elastic member cannot accurately be placed on the web.

[0005]

It is therefore an object of the present invention to provide a device for placing an elastic member capable of accurately forming a line of an elastic member on a web.

[0006]

[Means for Solving the Problems]

In order to achieve the object, a device of the present invention includes: a pair of nip rolls for sandwiching two webs therebetween and for sandwiching an elastic member between the two webs; a moving member, which is movable along an axial line being a center of rotation of the nip rolls; a guide section formed on

the moving member for guiding the elastic member between the two webs upstream of a position where the two webs are sandwiched; a transfer section capable of reciprocating the moving member; and a sensor for detecting the moving member at a predetermined position, wherein an original position of the moving member is set based on a detection signal from the sensor only when the moving member approaches the sensor while moving in a first direction.

[0007]

For example, in a case where the sensor is a photoelectric switch, or the like, the light-receiving portion of the sensor of the photoelectric switch has a predetermined width, and a member is detected when the light-receiving portion is shaded. Therefore, an error corresponding to the width of the light-receiving portion occurs in the relative position between the detected moving member and the photoelectric switch, depending on the direction in which the moving member approaches the sensor. This error translates into an error in the original position of the moving member, thus resulting in an error in the line along which the elastic member is placed.

[0008]

In contrast, with the present device, the original position of the moving member is determined based on a signal from the sensor only when the moving member is moving in the first direction (a predetermined direction). Therefore, it is possible to accurately detect the position of the moving member, irrespective of the detection width of the sensor. Therefore, since it is possible to accurately obtain the original position of the moving member, it

is possible to very accurately form the line.

[0009]

Another device of the present invention includes: a pair of nip rolls for sandwiching two webs therebetween and for sandwiching an elastic member between the two webs; a moving member, which is movable along an axial line being a center of rotation of the nip rolls; a guide section formed on the moving member for guiding the elastic member between the two webs upstream of a position where the two webs are sandwiched; a transfer section capable of reciprocating the moving member at a predetermined cycle; a motor capable of rotating in a forward direction and in a reverse direction to drive the transfer section so that the elastic member is placed on the web along a predetermined trace; and a sensor for detecting the moving member at a predetermined position; and a controller for determining an original position of the motor based on a detection signal from the sensor. The controller determines the original position based on a detection signal from the sensor when the moving member is moving in a predetermined first direction, and does not determine the original position when the moving member is moving in a second direction different from the first direction.

[0010]

The motor may be a servomotor that rotates according to predetermined control data. The control data for the servomotor may be determined based on a control pattern such as a predetermined velocity curve. The control pattern may be prestored in storage means for each size and type of a product to be produced.

[0011]

Since the guide section is provided adjacent to the nip rolls, it may be difficult to maintain when, for example, an adhesive applied on a web attaches to a roll or when a web or an elastic member is broken.

[0012]

In contrast, if at least one of the pair of nip rolls is movable away from the other nip roll, the rolls can be spaced apart from each other, thereby improving the maintainability.

[0013]

Moreover, if the placement device further includes a stand to which the transfer section and the moving member are attached, and the distance between the nip point between the pair of nip rolls and the guide section can be changed, the guide section can be moved away from the nip point when maintaining the device, thereby making the maintenance even easier.

Furthermore, if the stand can be pulled out along the axial line of the nip rolls, the guide section or the transfer section can be moved to a more spacious place for maintenance, thus further improving the maintainability.

[0014]

[Embodiments of the Invention]

An embodiment of the present invention will now be described with reference to the drawings.

FIG. **1** to FIG. **8** illustrate a first embodiment.

General Configuration:

FIG. **1** illustrates a production apparatus for producing an article. Specifically, a production apparatus **29** is capable of producing a pants-type diaper, which is a type of worn article.

The production apparatus **29** includes a first cutter unit for cutting off a mat W_m, a first connection unit **21** for connecting the end of a combined member obtained by placing and combining another web onto the cut-off mat, a second cutter unit **22** for cutting between the connected portions, and a guide unit (device for placing an elastic member) **23** for guiding and introducing an elastic member **Wf** between webs **W**. The connection method may be adhesive application or heat seal.

[0015]

The production apparatus **29** further includes a combining unit **24** for combining a combined member on the webs **W1** and **W2**, into which the elastic member **Wf** has been introduced, a trim cutter unit **25** for making a leg hole, etc., in the combined web, a folding unit **26** for folding in two the web with the hole made therein, a second connection unit **27** for connecting the boundary between semi-finished articles, and a third cutter unit **28** for cutting off the web along the connected portion or between the connected portions into individual articles.

[0016]

Guide Unit **23**:

FIG. **2** is a partially-cutaway perspective view illustrating an example of the guide unit **23**, FIG. **3** is a plan view of the unit, and FIG. **4** is a schematic side view of the unit.

[0017]

As shown in FIG. **2**, the present production apparatus includes a pair of nip rolls **1**, first attachment means **A** and second attachment means **B**.

The nip rolls **1** nip two webs **W1** and **W2** (FIG. **1**) therebetween, along with the elastic member **Wf** between the two webs **W1** and **W2**, and are driven by a roll motor **50**. The roll motor **50** may be a servomotor, for example. The roll motor **50** is controlled by a controller **7** to be described later.

[0018]

Arms **5** and **6**:

The first attachment means **A** includes a first transfer section **13**, and a first arm (moving member) **5** for guiding at least one elastic member **Wf** near the position where the nip rolls **1** and **1** meet each other. The second attachment means **B** includes a second transfer section **14**, and a second arm (moving member) **6** for guiding at least one elastic member **Wf** near the position where the nip rolls **1** and **1** meet each other. The first transfer section **13** reciprocates the first arm **5** in the width direction MD of the first web **W1**. The second transfer section **14** reciprocates the second arm **6** in the width direction MD of the second web **W2**.

[0019]

Transfer Sections **13** and **14**:

As shown in FIG. **3(a)**, the transfer section **13** includes a pair of pulleys **15a** and a belt **15** wound around the pulleys **15a**, and the second transfer section **14** includes a pair of pulleys **16a**

and a belt **16** wound around the pulleys **16a**. One of the pulleys **16a** and **16a** of the second transfer section **14** is rotated by a first motor **51** of FIG. **2**. Also for the first transfer section **13**, a second motor **52** (FIG. **5(a)**) similar to the motor **51**.

[0020]

The first and second motors **51** and **52** may each be a servomotor, in which case the rotation of the motor, etc., can easily be controlled. The motors **51** and **52** are controlled based on a motor control pattern supplied from the controller **7**, as will be described later.

Moreover, the first and second motors **51** and **52** may be connected to the pulleys **15a** and **16a**, respectively, may be placed away from each other near the opposite ends of the nip rolls **1** and **1**, or may be placed closer to the middle of the nip rolls **1** and **1** in the width direction MD. Moreover, each pair of pulleys **15a** or **16a** may be both driven by a pair of motors.

[0021]

A first bracket **11** and a second bracket **12** are attached to the belts **15** and **16** of FIG. **3(a)**, respectively, and the arms **5** and **6** are fixed to the brackets **11** and **12**, respectively. For example, the pair of transfer sections **13** and **14** are placed facing each other, so that the first and second brackets **11** and **12** are moved in the space SP between the pair of transfer sections **13** and **14**. As the belts **15** and **16** are moved, the brackets **11** and **12** are reciprocated in the width direction MD of the webs **W1** and **W2** shown in FIG. **3(b)**.

[0022]

Note that the position of the belts **15** and **16** is not limited

to that shown in FIG. **3(a)**. Moreover, the belts **15** and **16** may be shifted from each other in the tangential direction z of the nip rolls **1** and **1** (the up-down direction in FIG. **4**). For example, the rotational axes of the pulleys **16a** of the belt **16** may be located inside the belt **15**. Then, the movement of the brackets **11** and **12** is less influenced by the pulleys **16a** and **15a**. Moreover, since the belts **15** and **16** are shifted from each other in the up-down direction Z, the brackets **11** and **12** can be shifted significantly with respect to the width direction (left-right direction) MD. Therefore, the width of the brackets **11** and **12** of FIG. **3** can be made larger than the space SP between the two belts **15** and **16**.

[0023]

Guide Sections **5a** and **6a**:

The first arm **5** of FIG. **2** includes at least one first guide section **5a** for guiding the elastic member **Wf** near the position where the nip rolls **1** and **1** meet each other, and the second arm **6** of FIG. **2** includes at least one second guide section **6a** for guiding the elastic member **Wf** near the position where the nip rolls **1** and **1** meet each other. The centers of the guide sections **5a** and **6a** may be generally along the same straight line, for example. The guide sections **5a** and **6a** may be placed generally along a virtual plane **200** shown in FIG. **4** (the plane at which the nip rolls **1** and **1** meet each other). Herein, "generally" means that the guide sections may not be placed completely along a single plane **200**.

Note that the elastic member **Wf** may be supplied to the guide sections **5a** and **6a** while passing through the inside of the loops

of the belts **15** and **16**, respectively.

[0024]

An adhesive is applied on at least one of the webs **W1** and **W2**. The application may be continuous or intermittent. In a case where a hot melt is used as an adhesive, the hot melt may be applied by using any of beads, a coater, a spiral, a curtain, a spray, a transfer roll, etc. Types of hot melt that can be used include a synthetic rubber-based hot melt, an olefin-based hot melt, etc. Moreover, an adhesive as described above may be applied on the elastic member.

[0025]

Trim Cutter Unit **25**:

In FIG. **1**, the trim cutter unit **25** is provided downstream of the guide unit **23**. As illustrated in FIG. **8**, the trim cutter unit **25** includes a trim roll (die cutter) **25a** including at least one loop-shaped blade **25c**, and an anvil roll **25b**, so that a portion located between the blade **25c** and the anvil roll is cut off. The phase of the trim roll **25a** can be detected by an encoder **100** (FIG. 5). The encoder **100** may be attached directly to the trim roll **25a**, or to a transmission device for transmitting the power to the trim roll **25a**. Note that the trim cutter unit may alternatively be provided upstream of the guide unit. In such a case, holes are made in the webs **W1** and **W2** with the trim cutter **25**.

[0026]

Control Configuration:

The roll motor **50**, the first motor **51**, the second motor **52**,

first to fourth sensors **S1** to **S4** to be described later, and peripheral unit control means **53** to be described later are connected to the controller **7** shown in FIG. **5** via an interface (not shown). The controller **7** controls these components. Other units **21**, **22**, **24** to **28** and the encoder **100** may be connected to the controller **7**. In such a case, the controller **7** can control the other units **21**, **22**, **24** to **28**. The controller **7** controls the production of worn articles while synchronizing the other units **21**, **22**, **24** to **28** and the guide unit **23** with one another.

[0027]

Note that a touch screen **54** for input/output operations, for example, may be connected to the controller **7**. The touch screen **54** is capable of displaying various information on the screen, and an input can be made by touching on the screen.

[0028]

The controller **7** includes a CPU **7a** and a memory **7b**.

The CPU **7a** has a production mode for producing articles and a positioning mode for positioning the various components to their origins at start-up.

The memory **7b** includes a pattern storage section **7c**. Article sizes, sensor numbers, arrangement patterns of the elastic member **Wf**, and the velocity curves (motor control patterns) for the first and second motors **51** and **52**, are prestored in the pattern storage section **7c** while being associated with one another. The motor control pattern may be velocity curve data corresponding to the rotational speed of the motors **51** and **52**, or rotational acceleration sampling

data.

[0029]

The controller **7** controls the rotational speed, the rotational acceleration, etc., of the motors **51** and **52**, based on the stored information read out from the pattern storage section **7c**. The control by the controller **7** may be feed-forward control, feedback control, fuzzy control, optimal control, neural control, robust control, or the like. In a case where feedback control is used, for example, the controller **7** reads out, from the memory **7b**, rotation information of the motors **51** and **52** corresponding to the information on the arrangement of the elastic member **Wf** for the pattern being selected, and controls the voltages to be applied to the motors **51** and **52**, the currents flowing through the motors **51** and **52**, and/or the frequencies thereof, based on the readout data.

[0030]

In a case where an elastic member is arranged periodically (e.g., a case where the line of the elastic member **Wf** includes a curve as shown in FIG. **3(b)**), the position information of the webs **W1** and **W2** may be fed back to the controller **7** in order to prevent the elastic member **Wf** and the webs **W1** and **W2** from being shifted from each other in the web flow direction. The position information of the webs **W1** and **W2** may be obtained by actually measuring the flow of the webs **W1** and **W2** with sensors (infrared sensors, ultrasonic sensors, or air sensors), may be calculated from the rotation information of the nip rolls **1**, or may be determined based on both

the measurement values from the sensors and the rotation information so as to improve the precision. The rotation information of the nip rolls **1** is measured directly or indirectly via an encoder, etc., and input to the controller **7**.

[0031]

The controller **7** produces a control signal for controlling the motors **51** and **52** based on the position information of the webs **W1** and **W2** and the velocity curves read out from the pattern storage section **7c**. The motors **51** and **52** are controlled based on the control signal, and the rotational energies from the motors **51** and **52** are transmitted directly or indirectly to the guide sections **5a** and **6a**, respectively.

With such a control signal, when the motors **51** and **52** of FIG. **3** rotate in the forward direction (the clockwise direction in FIG. **3**), whereby the pulleys **15a** and **16a** rotate in the forward direction, the arms **5** and **6** each move in the direction MD1 (hereinafter referred to as the "forward direction") from a predetermined outermost position O toward a predetermined innermost position I of the moving range of the arms **5** and **6**. On the other hand, when the pulleys **15a** and **16a** rotate in the reverse direction (the counterclockwise direction), the arms **5** and **6** each move in the direction MD2 (hereinafter referred to as the "reverse direction") from the innermost position I toward the outermost position O.

[0032]

Synchronization With Other Units:

As the guide sections **5a** and **6a** return to the origin, it

is possible to match the phase with respect to the processing operation to be performed on the webs **W1** and **W2** upstream or downstream of the present production apparatus. In a case where the present production apparatus is incorporated in a system for producing a disposable worn article, the processing operation to be performed on the webs **W1** and **W2** on the upstream side or the downstream side includes a process of placing absorbents on the web at a predetermined pitch, a process of making holes at a predetermined pitch through which the legs of a wearer are to be passed, etc.

[0033]

The phase-matching method will now be described for the trim cutter unit **25**, for example.

The position of the blade **25c** attached to the trim roll **25a** changes as the trim roll **25a** rotates. The position of the blade **25c** can be detected by the encoder **100**, for example. The encoder **100** may be attached directly to the trim roll **25a**, or to a unit that transmits the power to the trim roll **25a**.

Based on a signal from the encoder **100**, the controller **7** stops the trim roll **25a** at a predetermined rotational position, and moves the blade **25c** to a predetermined position. When the controller **7** comes to know, based on a signal (return-to-origin signal) from the encoder **100**, that the trim roll **25a** is at a predetermined position (phase), the controller **7** returns the guide sections **5a** and **6a** to their predetermined original positions by the positioning mode to be described later. Thus, by positioning the blade **25c** and the guide sections **5a** and **6a** at the original positions,

i.e., the starting point at which a new cycle starts, it is possible to match the phase of the blade **25c** with that of the guide sections **5a** and **6a** and start the present device.

[0034]

Positioning Mode:

In the positioning mode, when the trim roll **25a** is in a predetermined phase, the controller **7** receives a return-to-origin signal from the encoder **100**, and sets the arms **5** and **6** at their original positions based on the return-to-origin signal. Thus, the position of leg holes is aligned with the line of an elastic member. The sensors **S1** to **S4** are for detecting the arms **5** and **6**, and may be optical sensors. Note that the sensors **S1** to **S4** may detect the guide sections **5a** and **6a** of the arms **5** and **6**.

[0035]

Next, the method of the positioning will be described briefly.

While the elastic member **Wf** is arranged in the shape of a line as shown in FIG. **3(b)**, the following description will be directed to a case where the original positions of the arms **5** and **6** are set to be at one end of the line of the elastic member **Wf**, e.g., the outer end Ws. While the first and second sensors **S1** and **S2** correspond to an article size S and the third and fourth sensors **S3** and **S4** correspond to an article size L, the sensors **S1** and **S2** corresponding to the size S will be described in the following description.

[0036]

When restarting the rotation of the trim roll **25a**, e.g.,

after the replacement of the trim roll **25a**, the encoder **100** detects that the trim roll **25a** is in a predetermined phase and outputs a return-to-origin signal to the controller **7**. By this signal, the controller **7** moves the arms **5** and **6** toward the origin. In this case, the arms **5** and **6** of FIG. **3** once move to the outermost position O and then start moving at a low speed toward the innermost position I.

When the sensors **S1** and **S2** detect the arms **5** and **6**, the controller **7** stops the motors **51** and **52** to stop the movement of the arms **5** and **6**. The stop position (original position) of the arms **5** and **6** corresponds to the starting point (origin) Ws at which the guide sections **5a** and **6a** start placing the elastic member **Wf**. Therefore, the controller **7** determines the stop position of the motors **51** and **52** to be the original position of the motors **51** and **52**.

[0037]

The light-receiving portion of the sensors **S1** and **S2** has a predetermined width Sa, and it is determined that the arms **5** and **6** are detected when the light-receiving portion is shaded. Therefore, if the arms **5** and **6** approach the sensors **S1** and **S2** from different directions, there occurs an amount of error corresponding to the width Sa of the light-receiving portion in the relative position between the detected arms **5** and **6** and the sensors **S1** and **S2**. Since this error becomes an error in the original positions of the arms **5** and **6**, it will appear as an error in the placement lines of the arms **5** and **6**.

[0038]

In view of this, with the present device, the detection signal indicating the detection of the arms **5** and **6** from the sensors **S1** and **S2** is considered valid only when the arms **5** and **6** move from one end (e.g., the outermost position O) toward the other end (e.g., the innermost position I), i.e., in a predetermined direction. Therefore, the positions of the arms **5** and **6** can be detected accurately, irrespective of the detection widths of the sensors **S1** and **S2**. Therefore, the original positions of the arms **5** and **6** can be obtained accurately, whereby it is possible to form the line very accurately.

Note that the sensors **S1** and **S2** may detect the arms **5** and **6** only when the arms **5** and **6** move to the innermost position I and then toward the outermost position O.

When the article size L is selected, the motors **51** and **52** are positioned based on the return-to-origin signal of the third and fourth sensors **S3** and **S4**.

[0039]

Production Method:

An exemplary production method using the present device will now be described, focusing on the operation of the guide unit **23**.

In the production mode, an adhesive is applied continuously or intermittently on at least one of the two webs **W1** and **W2** as described above. The webs **W1** and **W2** are passed to the nip rolls **1** and **1**.

The motors **51** and **52** located upstream of the nip rolls **1** and **1** of FIG. **2** move the guide sections **5a** and **6a** in the direction MD across the web **W1**. The controller 7 controls the motors **51** and

52 based on the motor control pattern read out from the memory **7b**. The elastic member **Wf** is guided between the two webs **W1** and **W2**, and pressed together by the nip rolls **1**.

Where the disposable worn article is a diaper, portions to be leg gathers of the diaper are formed by the elastic member **Wf**. Then, holes through which the legs of a wearer are to be passed are made in a laminate obtained by pressing together the elastic member **Wf** and the webs **W1** and **W2**.

[0040]

For example, when producing an article of a size different from the size of the article being currently produced, the operator performs a predetermined operation to once stop the operation of the present device.

Then, the operator specifies the article to be produced next by using the touch screen **54**, in response to which the CPU **7a** reads out, from the pattern storage section **7c**, sensor numbers and motor velocity curves corresponding to the size of the article to be produced next. On the other hand, the various components of the other units **21**, **22**, **24** to **28** are returned to their original positions.

[0041]

The CPU **7a** starts the positioning mode of the arms **5** and **6**. The positioning mode will now be described with reference to the flow chart of FIG. **6**.

For example, a case where the article size is S and the sensors **S1** and **S2** are selected will now be described.

When the positioning mode is started, the arms **5** and **6** start

moving and the process proceeds to step S1. The arms **5** and **6** move toward one end (O or I) and then move from that end toward the other end (I or O). In step S1, while the arms **5** and **6** are moving, it is determined that whether the rotation direction of the motors **51** and **52** is the forward direction or the reverse direction. If the direction is the forward direction, the process proceeds to step S2.

In step S2, it is determined whether or not the first sensor **S1** has detected the first arm **5**. When the first sensor **S1** has detected the first arm **5**, the detection signal from the sensor **S1** is taken in by the controller **7**, and the process proceeds to step S3. If the arm **5** is not detected, the process returns to step S1, and the determination process is repeated.

In step S3, the controller **7** stops the motor **51** to stop the arm **5**, and determines that the stop position of the first motor **51** is the original position of the first motor **51**. The stop position of the arms **5** and **6** corresponds to the origin (starting point) Ws at which the guide sections **5a** and **6a** start placing the elastic member **Wf**, as described above.

Note that the positioning process is similarly performed for the second sensor **S2**.

[0042]

Thereafter, as the various components start, the guide sections **5a** and **6a** of the guide unit **23** and the various components of the units **21**, **22**, **24** to **28** start at their origins (starting points) at the start, whereby an in-phase, synchronized operation can be

performed with the phases of the units **21**, **22**, **24** to **28** of various devices being matched with one another.

[0043]

Note that holes through which legs are to be passed may be made before the elastic member **Wf** is sandwiched between the two webs **W1** and **W2**. An absorbent is placed on a laminate pressed together. The absorbent may be placed on the laminate before making the holes. The absorbent may include a highly absorbent polymer containing at least one of a pulp, an acrylic ester, and a water-soluble polysaccharide. Moreover, the absorbent may include an airlaid material. The laminate, on which the absorbent has been placed, is cut off into pieces of a predetermined length (pitch) by using a cutter. The cut-off web piece is folded as necessary. Note that before the laminate is cut off by a cutter, the continuous laminate may be folded in two along the web flow direction.

Curved fit gathers as shown in Japanese Laid-Open Patent Publication No. 7-299094 may be formed along with the leg gathers. Note that in order to place curved fit gathers on diapers with no leg gathers, a pattern for placing fit gathers may be used instead of a pattern for forming the leg gathers.

[0044]

Stand:

The nip rolls **1** may be housed in housings **36**, as shown in FIG. **7(a)**. At least one of the housings **36** is movable along a groove or a rail provided on a frame **35**. When maintaining the production apparatus, the nip rolls **1** can be spaced apart from each other by

moving the housing **36**, as illustrated in FIG. **7B**.

[0045]

The guide unit **23** includes a stand **30**, to which the attachment means **A**(**B**) including the transfer section **13** (**14**), the arm **5** (**6**), etc., is attached. The stand **30** includes a lift section **31**, on which the attachment means **A**(**B**) is mounted, and a fixed section **32**. The lift section **31** can be moved in the up-down direction Z with respect to the fixed section **32** by an elevating device (not shown), for example. The elevating device may be an air cylinder or a motor. In a case where a motor is used, the elevating mechanism may employ cams, links, or screws.

In a case where the elevating mechanism uses an air cylinder, the present apparatus may include a stopper **33**, wherein the lift section **31** is stopped from moving up as it comes into contact with the stopper **33**.

In a case where a motor is used as the elevating mechanism, a lift limit sensor **34** being an optical sensor, for example, may be provided near the lift limit of the lift section **31**. The lift of the lift section **31** may be stopped when the lift limit sensor **34** detects the lift section **31** being lifted.

Therefore, by moving the lift section **31** up and down, it is possible to change the distance between the nip point N between the pair of nip rolls **1** and the guide sections **5a** and **6a**.

[0046]

The main structure of the present apparatus may be provided with a rail **40** extending in the width direction MD. The stand **30**

can be moved in the width direction MD while being guided by the rail **40**. Therefore, when the elastic member **Wf** is broken, for example, the stand **30** can be pulled out, whereby it is easy to pass the elastic member **Wf** through the holes of the guide sections **5a** and **6a**.

[0047]

Next, a maintenance method will be described.

When an adhesive is attached to the surface of the nip rolls **1** or the guide sections **5a** and **6a**, one of the rolls **1** of FIG. **7(a)** is moved along a groove, etc., on the frame **35** so that the nip rolls **1** and **1** are spaced apart from each other, as illustrated in FIG. **7(b)**. Then, the lift section **31** is lowered in the z direction until the arms **5** and **6** are below the frame **35**, as illustrated in FIG. **7(b)**.

After the lowering, the stand **30** is pulled out toward the near side along the rail **40**.

Through these operations, the rolls **1** and **1** are spaced apart from each other, and the guide sections **5a** and **6a** can be moved to a more spacious place.

[0048]

Note that while the nip rolls **1** sandwich the elastic member **Wf** between the two webs **W1** and **W2** in the first embodiment, the elastic member **Wf** may be placed onto a single web **W1**. The elastic member **Wf** may be fixed to the web **W1** by applying an adhesive on the web **W1** or by heat seal. In such a case, a material having a good peelability with respect to the adhesive, such as a silicone rubber, may be

used for the nip rolls **1**, or the nip rolls **1** may be cooled.

[0049]

Second Embodiment:

A second embodiment will now be described.

Configuration Of Important Part:

As shown in FIG. **9**, a guide unit **23A** is provided with a first encoder **101** for detecting the phase of the pulleys **15a** and **16a**. The first encoder **101** may be attached directly to the pulleys **15a** and **16a**, or to the motors **51** and **52** (FIG. **10**) for driving the pulleys **15a** and **16a**.

[0050]

On the other hand, the trim cutter unit **25** is provided with a second encoder **100** for detecting the phase of the trim roll **25a**. The second encoder **100** may be attached directly to the trim roll **25a**, or to a transmission device for transmitting the power to the trim roll **25a**.

The second encoder **100** may be a type of an encoder that detects the absolute position of the trim roll **25a**. In such a case, an absolute-type rotary encoder that outputs a pulse signal indicating an absolute position according to the rotational angle may be used. Alternatively, for example, an optical sensor, or the like, may be separately provided to detect the absolute position of the trim roll **25a**.

[0051]

Control Configuration:

As shown in FIG. **10**, the units **21**, **22**, **24** to **28** are connected

to a primary motor **103** via a transmission device (not shown). Therefore, as the primary motor **103** rotates, the units **21**, **22**, **24** to **28** are driven in synchronization with the primary motor **103**.

The CPU **7a** detects the absolute position of the trim roll **25a**. Based on the output signal from the second encoder **100**, the CPU **7a** starts the operation of the guide unit **23A** when the trim roll **25a** first reaches a predetermined reference position P after the trim roll **25a** starts rotating.

Other than this, the present embodiment is similar to the first embodiment, and like elements will be denoted by like reference numerals and will not be described in detail below.

[0052]

Production Method:

A production method using the device of the second embodiment will now be described briefly.

For example, when producing an article of a size different from the size of the article being currently produced, the operator performs a predetermined operation to once stop the operation of the present device.

Then, the operator specifies the article to be produced next by using the touch screen **54** and then performs a predetermined operation, the CPU **7a** starts the positioning mode of the arms **5** and **6**.

[0053]

The positioning mode is similar to that of the first embodiment, and will not be further described below. By the

positioning mode, the arms **5** and **6** are stopped at a predetermined position, and the CPU **7a** recognizes the stop positions of the motors **51** and **52** to be their original positions.

[0054]

Then, the rotation of the primary motor **103** is started, and the operations of the units **21**, **22**, **24** to **28** are started.

Based on the output signal from the second encoder **100**, the CPU **7a** starts the operation of the guide unit **23A** when it is determined that the trim roll **25a** first reaches a predetermined reference position P after the trim roll **25a** starts rotating.

[0055]

Thus, as the units **21**, **22**, **24** to **28** are driven by a single primary motor **103**, it is possible to perform an in-phase, synchronized operation. When the trim roll **25a** starts rotating and reaches the reference position P, the operation of the guide unit **23A** is started, whereby it is possible to perform an in-phase, synchronized operation. Therefore, an in-phase, synchronized operation can be performed with the phases of the units **21** to **28** of various devices, including the guide unit **23A**, being matched with one another.

Generally, the inertia of the roll **25a** is significant. Even with the roll **25a** having a significant inertia, as the operation of the guide unit **23A** having a small inertia is started after the roll **25a** starts rotating, the trim roll **25a** and the guide unit **23A** can easily operate in an in-phase, synchronized operation.

[0056]

Note that while the phase-matching method has been described

in the second embodiment above with respect to the trim cutter unit **25**, the phase matching may be done by detecting the phase of any of the other units **21**, **22**, **24** to **28**, instead of detecting the phase of the trim roll **25a**.

[0057]

[Effect of the Invention]

As described above, with the device for placing an elastic member of the present invention, the original position is set based on a detection signal from the sensor when the moving member approaches the sensor while moving in the first direction, whereby it is possible to accurately detect the position of the moving member even if the sensing section of the sensor has some width. Therefore, it is possible to accurately form a line of the elastic member by determining the original position of the moving member based on such detection.

Moreover, for different sizes of worn articles, a plurality of sensors are provided, and different motor control patterns are stored in a memory device, whereby the elastic member can be placed with a different original position and a different arrangement pattern for each size.

[0058]

Moreover, the nip rolls are provided so that at least one nip roll can be moved away from the other nip roll, so that the nip rolls can be spaced apart from each other during the maintenance operation, thereby improving the maintainability.

Moreover, the stand can be moved so that the guide section is moved away from the nip point between the pair of nip rolls,

thereby further improving the maintainability.

Moreover, the moving member and the transfer section can be moved along the axial line of the nip rolls, whereby the guide section can be pulled out, thus further improving the maintainability.

[Brief Description of the Drawings]

[FIG. 1]

A perspective view illustrating an apparatus for producing an article according to a first embodiment of the present invention.

[FIG. 2]

A perspective view illustrating a device for placing an elastic member, as viewed from below.

[FIG. 3]

(a) is a schematic plan view illustrating the placement device, and **(b)** is a front view illustrating an elastic member arrangement pattern.

[FIG. 4]

A schematic side view illustrating the placement device.

[FIG. 5]

A schematic diagram illustrating a configuration of the placement device, and a table illustrating information stored in a storage section.

[FIG. 6]

A flow chart illustrating a positioning mode.

[FIG. 7]

Schematic side views illustrating a method for maintaining a placement device.

[FIG. 8]

A schematic diagram illustrating a trim cutter unit.

[FIG. 9]

A schematic side view illustrating a guide unit and trim cutter unit according to a second embodiment.

[FIG. 10]

A schematic diagram illustrating a configuration of a placement device.

[Description of the Reference Numerals]

1: Nip rolls

5: First arm (moving member)

5a: First guide section

6: Second arm (moving member)

6a: Second guide section

13: First transfer section

14: Second transfer section

51: First motor

52: Second motor

S1: First sensor

S2: Second sensor

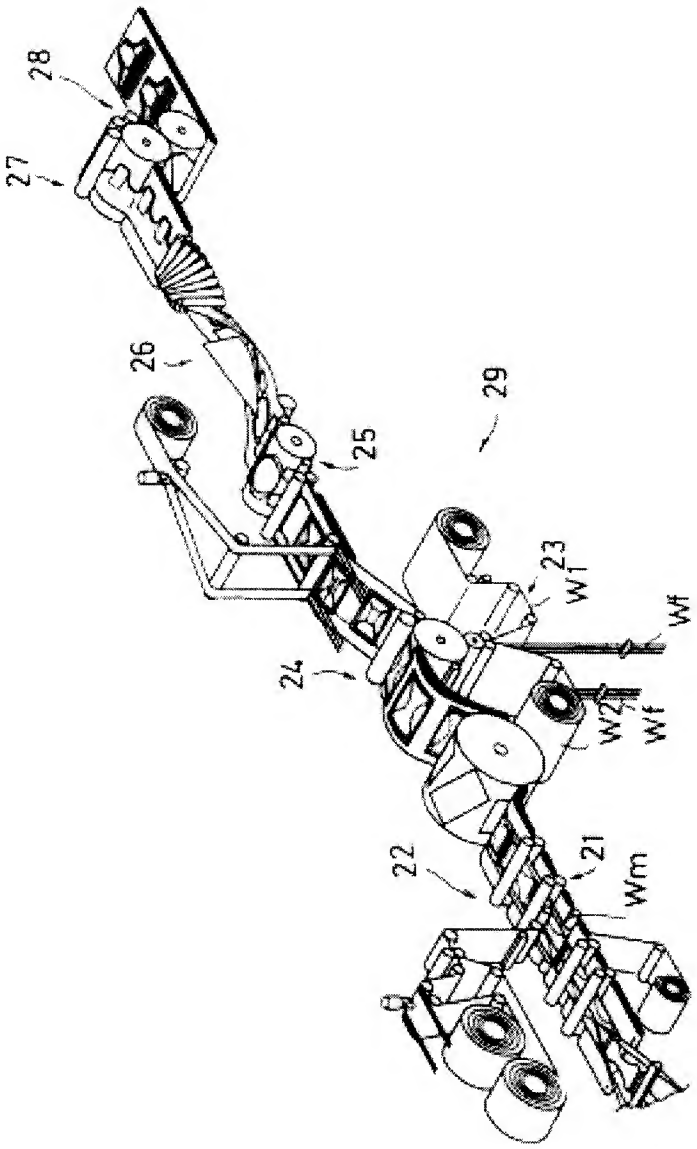
S3: Third sensor

S4: Fourth sensor

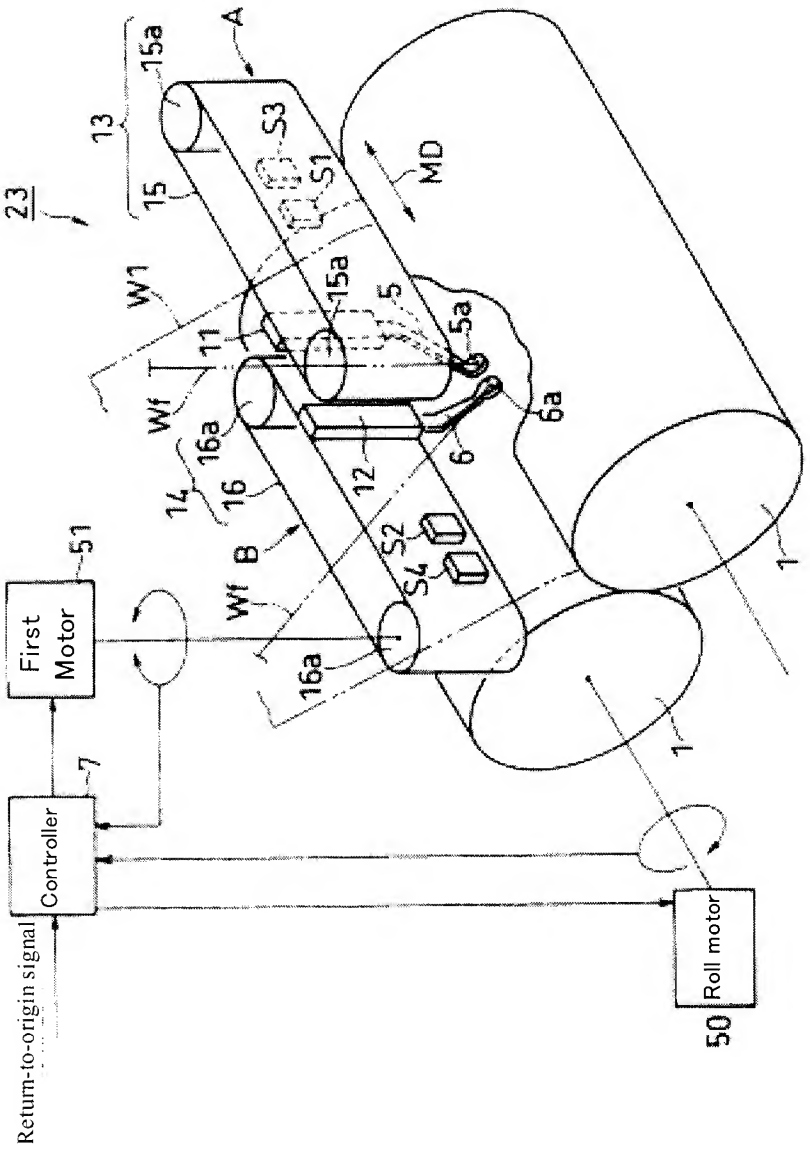
W1, W2: First web, Second web

[Name of the Document] DRAWINGS

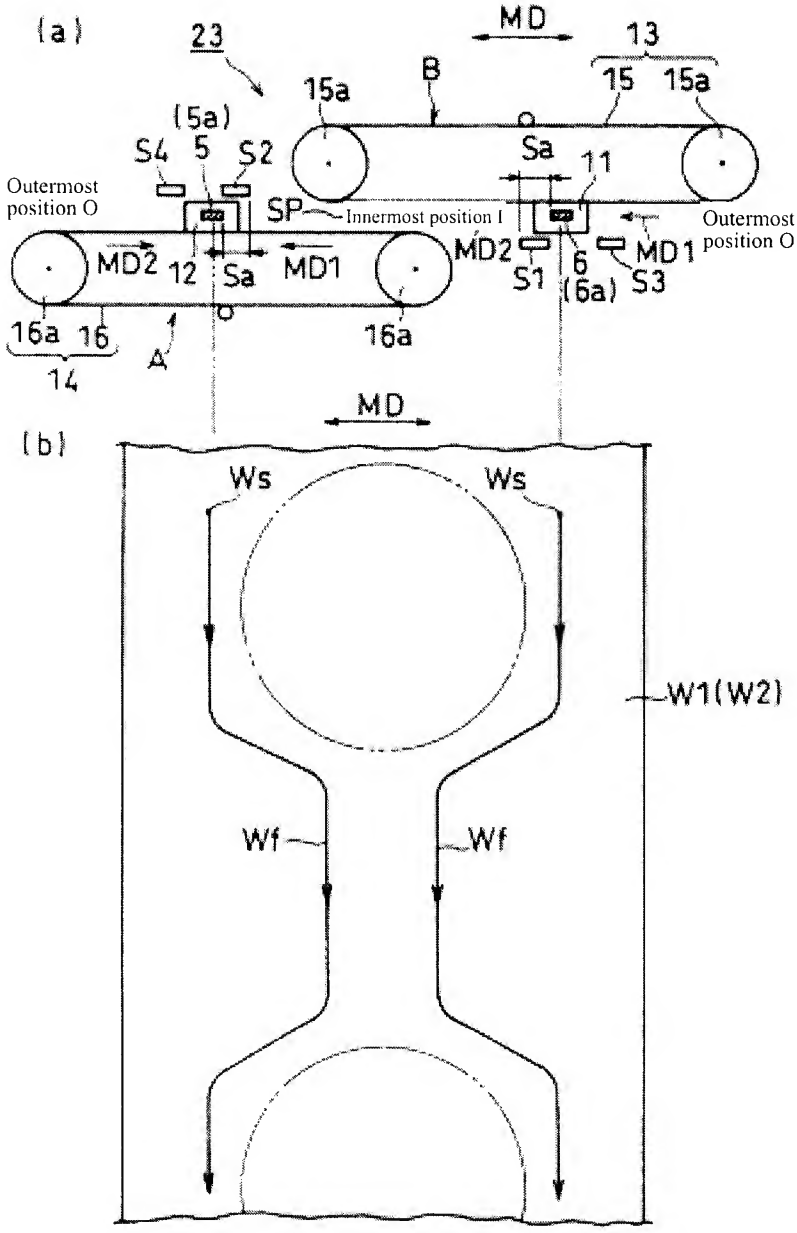
[FIG. 1]



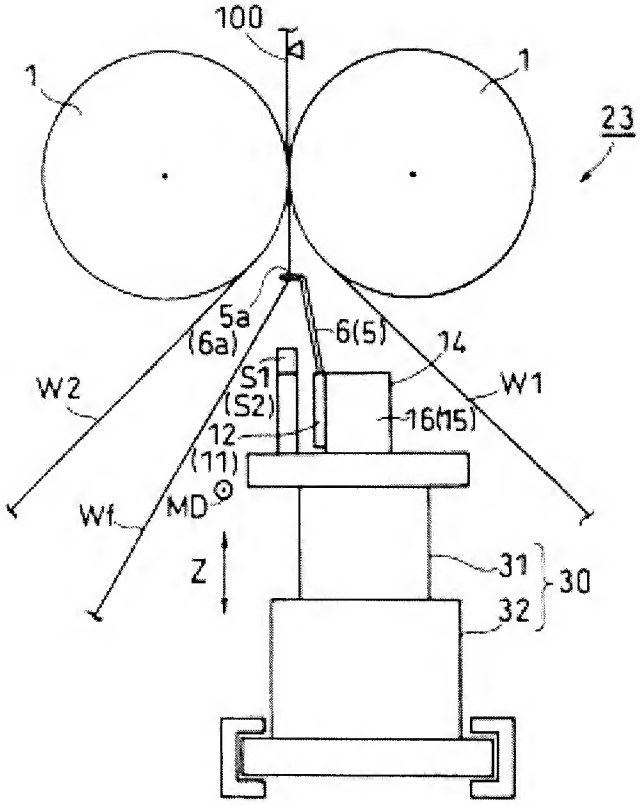
[FIG. 2]


23
13
15a
15
A
S3
S1
MD
W1
15a
5
5a
11
Wf
16a
6a
14
16
12
6
B
S2
S4
Wf
16a
1
1
1
First Motor
51
7
Controller
Return-to-origin signal
Roll motor
50

[FIG. 3]

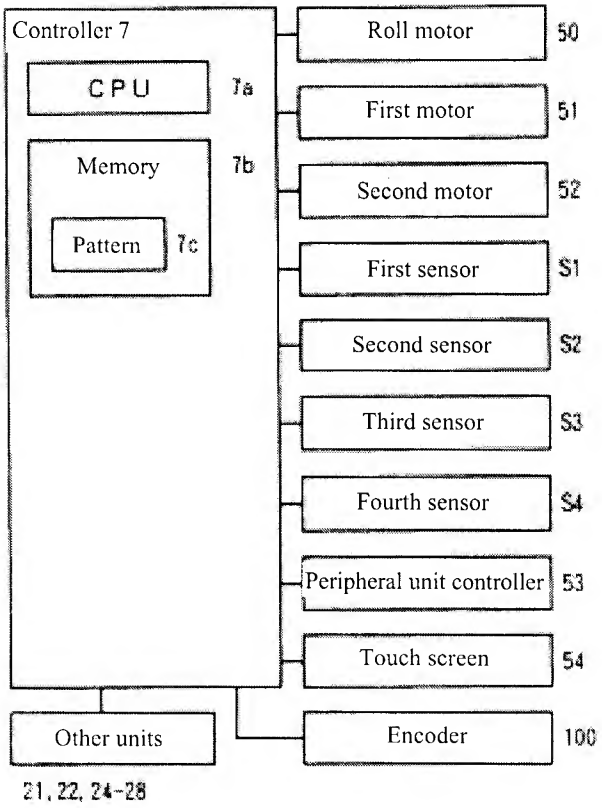

(a)
23
MD
13
15
15a
B
15a
(5a)
S4
5
S2
Sa
11
Outermost position O
SP
Innermost position I
Outermost position O
MD2
12
Sa
MD1
MD2
S1
6
(6a)
MD1
S3
16a
16
14
A
16a
(b)
MD
Ws
Ws
W1(W2)
Wf
Wf

[FIG. 4]

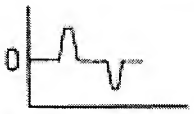
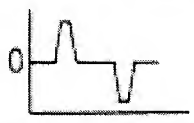


[FIG. 5]

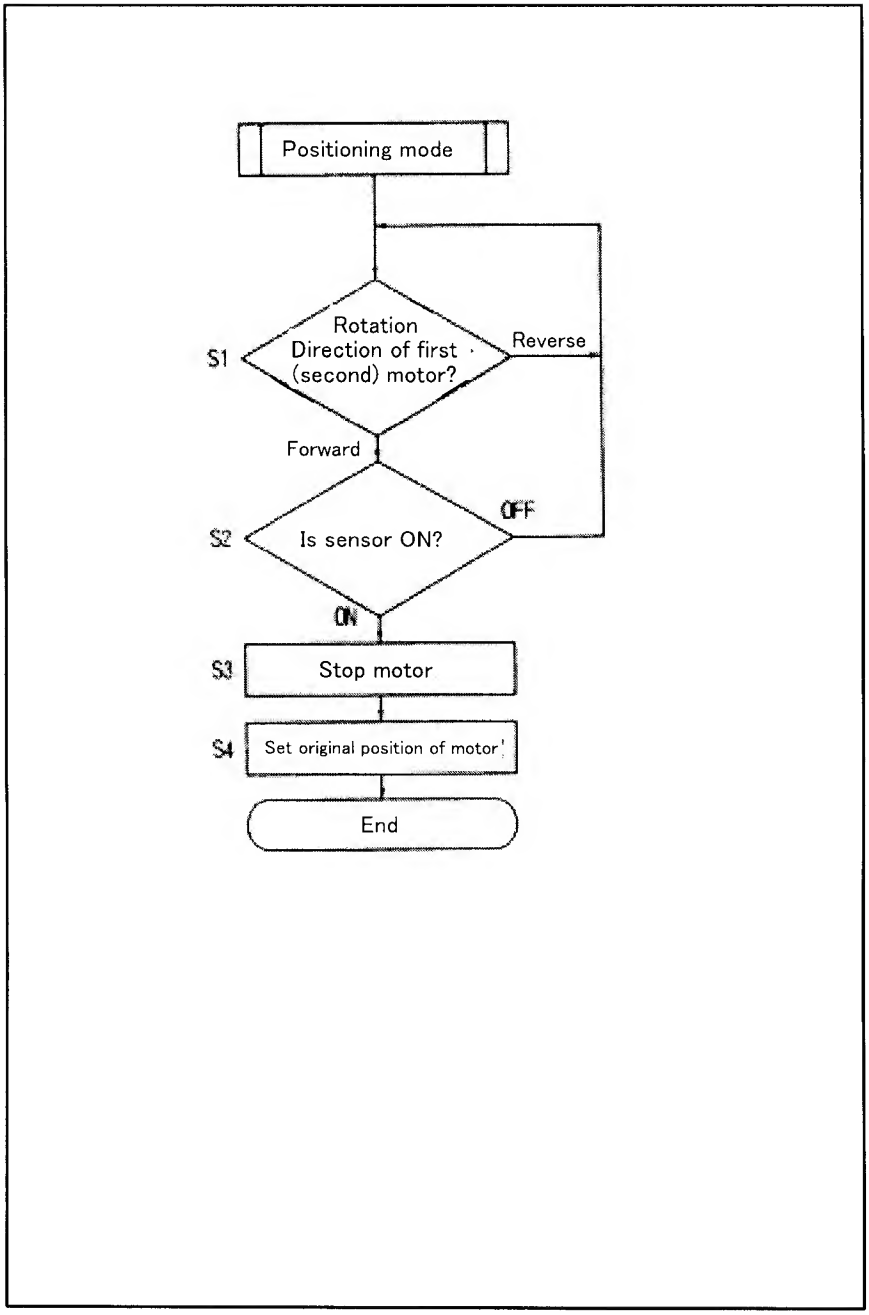
(a)



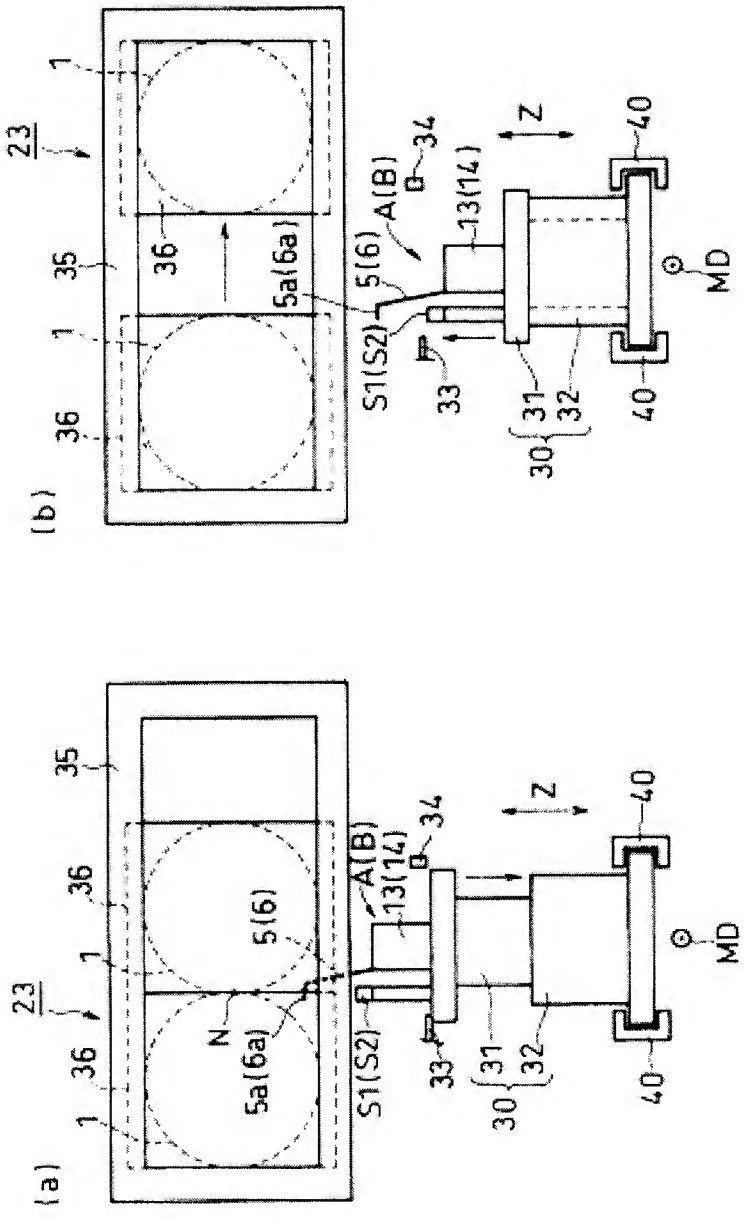
(b) Pattern storage section 7c

Size	Sensor No.	Arrangement Pattern	Velocity curve (motor control pattern)
S	S 1 S 2		
L	S 3 S 4		

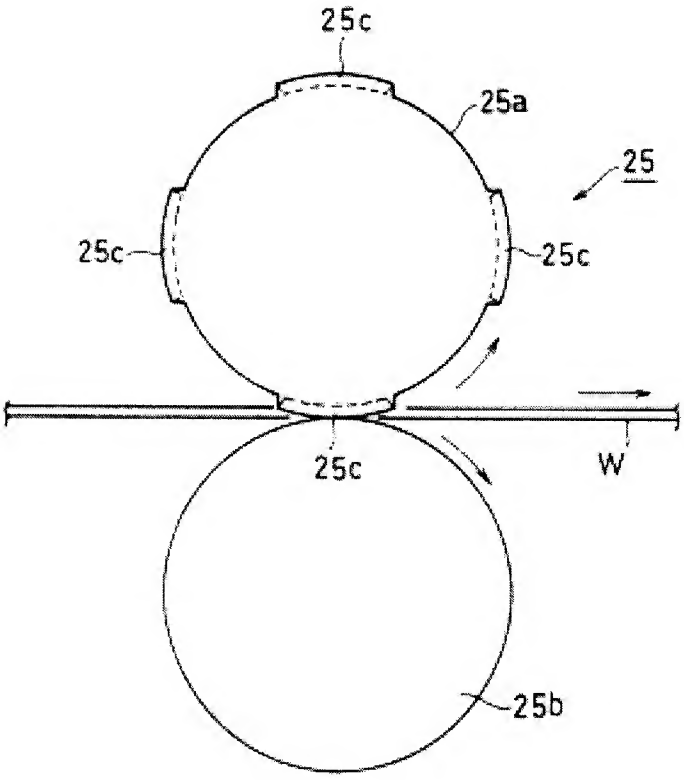
[FIG. 6]


Positioning mode
S1
Rotation Direction of first (second) motor?
Reverse
Forward
S2
Is sensor ON?
OFF
ON
S3
Stop motor
S4
Set original position of motor
End

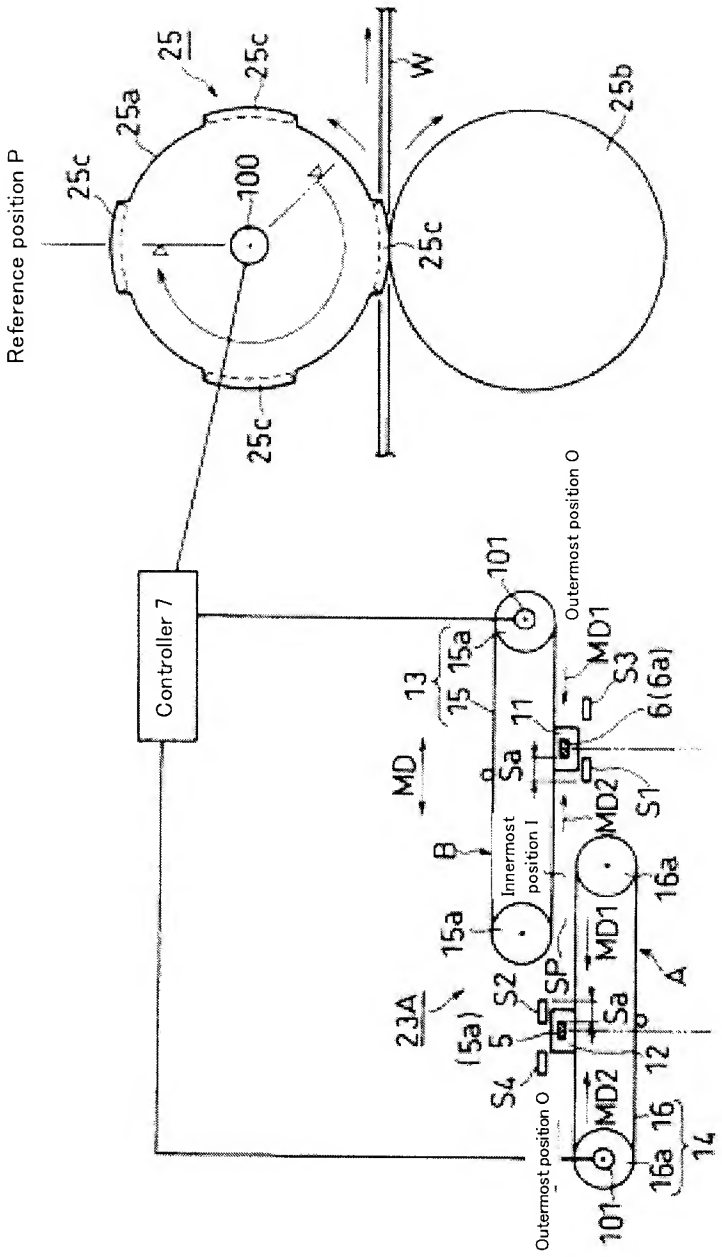
[FIG. 7]



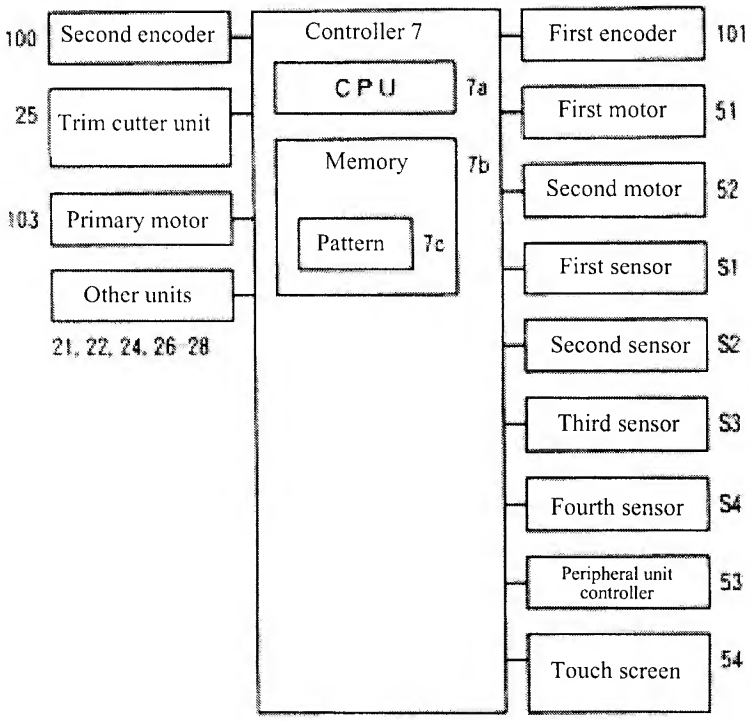
[FIG. 8]



[FIG. 9]


Reference position P
25
25a
25c
25b
W
100
Controller 7
101
Outermost position O
MD1
S3
6(6a)
MD
13
15
15a
11
Sa
MD2
S1
B
Innermost position I
16a
15a
S2
SP
MD1
A
23A
(5a)
5
Sa
S4
12
MD2
16
14
Outermost position O
101
16a

[FIG. 10]


100
Second encoder
25
Trim cutter unit
103
Primary motor
Other units
21, 22, 24, 26 28
Controller 7
CPU
7a
Memory
7b
Pattern
7c
First encoder
101
First motor
51
Second motor
52
First sensor
S1
Second sensor
S2
Third sensor
S3
Fourth sensor
S4
Peripheral unit controller
53
Touch screen
54

[Name of the Document] ABSTRACT

[Abstract]

[Problems] To provide a device for placing an elastic member capable of accurately forming a line of an elastic member on a web.

[Means for Solving the Problems] The device includes guide sections **5a** and **6a** for guiding elastic members **5** and **6** between two webs **W1** and **W2** upstream of a position where the two webs **W1** and **W2** are sandwiched, transfer sections **13** and **14** capable of reciprocating the moving members **5** and **6**, and sensors **S1** to **S4** for detecting the moving members **5** and **6** at a predetermined position, wherein the original positions of the moving members **5** and **6** are set based on detection signals of the sensors **S1** to **S4** only when the moving members **5** and **6** approach the sensors while moving in the first direction.

[Selected Figure] FIG. **3**